

PATENT SPECIFICATION

629.853



Application Date : Dec. 16, 1947.

No. 33144/47

Complete Specification Left : Dec. 13, 1948.

Complete Specification Accepted : Sept. 29, 1949.

Index at acceptance:—Classes 22, E2; and 130, C1a1.

PROVISIONAL SPECIFICATION.

Improvements in or relating to Garnitures for Cigarette-Making Machines.

We, DESMOND WALTER MOLINS, a British Subject, FELIX FREDERIC RUAU, a Citizen of France, CYRIL GRAHAM BRUCE, a British Subject, and MOLINS MACHINE COMPANY LIMITED, a British Company, all of 2 Evelyn Street, Deptford, London, S.E.8, do hereby declare the nature of this invention to be as follows:—

This invention concerns improvements in or relating to cigarette-making machines of the continuous rod type.

In a continuous rod cigarette-making machine, the cigarette rod runs through a device called a "garniture" in which the cigarette paper is folded about the filler rod, and (in the case where adhesive is used to seal the rod) has adhesive applied to one edge which is then folded down to overlap and stick to the other edge. The garniture comprises a base which has in it a groove to accommodate the moving band which carries the cigarette paper and filler rod. This groove usually tapers inwardly from one end of the garniture base and then merges into a straight portion, finally flaring out at the other end of the garniture base. As the band passes from the tapering portion to the straight portion of the groove its edges, and consequently the edges of the paper web, are turned upwardly and a pair of side guides fixed to the garniture base act to support and guide the upstanding edges. The band and paper also passes beneath a folder which engages one edge of the paper web to fold it down. The other edge, of the paper which is still upstanding, then has adhesive applied to it and then passes beneath a second folder which folds it down.

The surfaces of the garniture over which the band runs are, during operation, subject to considerable wear, which makes the life of the garniture relatively short, since it is essential to the production of satisfactory cigarettes that the dimensions of the groove in the garniture base should at all times be correct for the size of cigarette being made. The rapid wear on the surfaces of the groove and side guides is thought to be at least

[Price 2/-]

partly due to the abrasive action of particles of grit and sand, some of which may come from tobacco, carried by the fabric of the band.

Many attempts have been made in the past to provide the groove and the side guides with surfaces which are better able to withstand the wear to which they are subjected. These attempts have included the use of nitride-hardened portions for the rubbing surfaces, and tungsten-carbide has also been used. The latter, however, is so expensive as to be uneconomic.

An object of the present invention is to provide a relatively cheap and effective surface resistant to abrasion, for parts which are subjected to wear, and according to the present invention there is provided a garniture base comprising a composite structure having a ceramic material according to definition A, B, C, or D, to constitute a rubbing surface, and a support formed of material capable of reinforcing the more brittle ceramic material and so combined with the latter as to reinforce it.

Further according to the present invention there is provided a garniture having a garniture base formed with a ceramic lining, according to definition A, B, C, or D, which is so bonded to, or otherwise combined with, a material capable of reinforcing the more brittle ceramic material, as to be reinforced by the said material, and having side guides comprising ceramic material bonded to according to definition A, B, C, or D, or otherwise combined as aforesaid with a reinforcing material, the ceramic material being so arranged as to constitute rubbing surfaces.

Further according to the present invention there is provided a ceramic part according to the definition A, B, C, or D, adapted to be combined with a reinforcing support so as to form part of a ceramic lining of a garniture base, the said ceramic part being moulded with a central longitudinal groove or channel in one surface to form the groove of the garniture base, and with a pair of longitudinal grooves or channels formed in the reverse

surface, one at each side of the part, whereby the thickness of the member is reduced in order to reduce the possibility of internal defects when the part is fired.

- 5 The grooves may be so dimensioned that both of the surfaces containing the said grooves have substantially equal surface areas, so as to reduce the possibility of unequal surface shrinkage on cooling.
- 10 Ceramic material according to definition A, contains at least 90% of aluminous oxide. Ceramic material according to definition B contains from 75% to under 90% of aluminous oxide.
- 15 Ceramic material according to definition C contains at least 90% of silicon carbide. Ceramic material according to definition D contains from 75% to under 90% of silicon carbide.
- 20 Usually, the folders of a garniture are easily removable, and are relatively cheap, and consequently, the folders need not have ceramic rubbing surfaces, and in any case, ceramic surfaces on the folders might not
- 25 always be highly satisfactory in view of the fact that the ceramic material is extremely brittle. However, the present invention does not exclude a construction in which the rubbing surfaces of the folders are formed
- 30 of ceramic material.
- A garniture according to the present invention will now be described by way of example. The base of the garniture comprises an inset made of ceramic material to provide
- 35 a rubbing surface, combined with a reinforcing support made of a suitable metal, such as steel, which has a high tensile strength. The support has a relatively wide and deep channel of rectangular cross-section formed
- 40 in its upper surface, which is for the purpose of accommodating the ceramic inset. The ceramic inset is, for convenience, made in three parts, each of which is moulded and then ground to the desired shape and size.
- 45 In the upper surface of each of these three parts is formed a central longitudinal groove of such a nature that the three parts when arranged end to end have a continuous groove corresponding to the groove of an ordinary
- 50 garniture base. The three parts of the inset are fitted into the channel of the reinforcing support and are bonded to the latter in any suitable way, for example, by a suitable plastic bonding material. The bonding
- 55 material known under the name "Redux" has been found suitable for this purpose. Thus, when the parts are assembled, the ceramic inset forms a lining of the metal support, while the latter reinforces the brittle ceramic
- 60 inset.

Owing to the possibility of defects developing in the interior of the inset during manufacture, such as internal cracks or uneven crystallisation, it is desirable to keep

consistent with it being deep enough to take a groove of the necessary depth. This is done without reducing the overall depth of the inset by forming each part of the inset with two further longitudinal grooves on the 70 lower surface, that is, the reverse side to that in which the above-mentioned central groove is formed. These two further grooves are spaced apart one at each side of the part, and are so shaped and disposed as to reduce 75 the thickness of the part on each side of the central portion in which the central groove is formed, so that the thickness above these two grooves is the same (as nearly as practicable) as the thickness below the central 80 groove. They are also designed to increase the surface area of the lower side so as to make this area equal to the surface area of the upper surface in which the central groove is formed. The purpose of this equalisation 85 of surface areas is to reduce any tendency towards inequality in surface shrinkage when the material is fired, and so reduce the possibility of distorting the central groove, since it is of course important that this groove 90 should be straight.

Side guides made of ceramic material, moulded and ground to desired shape and size, are also bonded or otherwise secured to the reinforcing support of the garniture base. 95

A suitable ceramic material used in the example described, comprises aluminous oxide powder mixed with a proportion of zirconium, made into a clay and moulded into the desired shape, and then fired and thereby re-crystal- 100 lised. The proportions are such that the material contains at least 90% of aluminous oxide. The finished moulded part is then ground by diamond wheels. This material is found to have a very high resistance to 105 abrasion and to be suitable in other ways for use in making insets for garniture bases according to the invention. It is also a relatively cheap material and is well suited for moulding and grinding to produce the 110 necessary parts for the inset and the side guides. It will be understood, however, that ceramic comprising aluminous oxide with or without bonding agents may be employed with good result. 115

For example, the material may consist entirely of aluminous oxide. In an alternative construction according to the invention the proportions are such that the material contains from 75% to less than 90% of 120 aluminous oxide.

In a further alternative construction the ceramic material employed comprises at least 90% of silicon carbide, while in a still further alternative construction the material 125 contains from 75% to under 90% of silicon carbide.

It will be seen that by means of the present invention it is possible to employ ceramic material, which is relatively easy to mould, 130

for the rubbing surfaces of the lower part of the garniture. Consequently, in spite of the fact that it would probably be unsatisfactory to make the whole of the garniture base from ceramic material, owing to its extremely brittle nature, it is nevertheless possible to obtain a very advantageous construction by providing a ceramic inset bonded or

otherwise united to a support formed of a high tensile material so as to be reinforced thereby thus rendering the composite unit practicable.

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Dated the 11th day of December, 1947.

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COMPLETE SPECIFICATION.

Improvements in or relating to Garnitures for Continuous Rod Cigarette-Making Machines and other Continuous Rod Machines.

We, DESMOND WALTER MOLINS, a British Subject, FELIX FREDERIC RUAU, a Citizen of France, CYRIL GRAHAM BRUCE, a British Subject, and MOLINS MACHINERY COMPANY LIMITED, a British Company, all of 2 Evelyn Street, Deptford, London, S.E.8, do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement:—

This invention concerns improvements in or relating to garnitures for continuous rod cigarette-making machines and other machines of the continuous rod type.

In a continuous rod cigarette-making machine, the cigarette rod runs through a device called a "garniture" in which the cigarette paper is folded about the filler rod, and (in the case where adhesive is used to seal the rod) has adhesive applied to one edge which is then folded down to overlap and stick to the other edge. The garniture comprises a base which has in it a groove to accommodate the moving band which carries the cigarette paper and filler rod. This groove usually tapers inwardly from one end of the garniture base and then merges into a straight portion, finally flaring out at the other end of the garniture base. As the band passes from the tapering portion to the straight portion of the groove its edges, and consequently the edges of the paper web, are turned upwardly and a pair of side guides fixed to the garniture base act to support and guide the upstanding edges. The band and paper also pass beneath a folder which engages one edge of the paper web to fold it down. The other edge of the paper, which is still upstanding, then has adhesive applied to it and then passes beneath a second folder which folds it down.

The surfaces of the garniture over which the band runs are, during operation, subject to considerable wear, which makes the life of the garniture relatively short, since it is essential to the production of satisfactory cigarettes that the dimensions of the groove in the garniture base should at all times be correct for the size of cigarette being made. The rapid wear on the surface of the groove and side guides is thought to be at least partly due to the abrasive action of particles of grit

and sand, some of which may come from tobacco, carried by the fabric of the band. The term "garniture" when used herein shall, where the context permits, include not only "garnitures" used on machines in which cigarette rods are formed from a continuous core of tobacco but any equivalent device such as "garnitures" used on machines for making filter plugs as described in prior specification No. 423,570 or "garnitures" used on machines for assembling alternate lengths of cigarette rod and stubs as described in Specification No. 430,742. In all these cases similar or even identical folding means for the wrapper are employed, and the term "garniture" means and includes all such folding devices.

Many attempts have been made in the past to provide the groove and the side guides with surfaces which are better able to withstand the wear to which they are subjected. These attempts have included the use of nitride-hardened portions for the rubbing surfaces, and tungsten-carbide has also been used. The latter, however, is so expensive as to be uneconomic.

An object of the present invention is to provide a relatively cheap and effective surface resistant to abrasion, for parts which are subjected to wear, and according to the present invention there is provided a garniture base comprising a composite structure having a ceramic material according to definition A, B, C, or D, as set out below, to constitute a rubbing surface, and a support formed of material capable of reinforcing the more brittle ceramic material and so combined with the latter as to reinforce it.

Further according to the present invention there is provided a garniture having a garniture base formed with a ceramic lining, according to definition A, B, C, or D, as set out below, which is so bonded to, or otherwise combined with, a material capable of reinforcing the more brittle ceramic material, as as to be reinforced by the said material, and having side guides comprising ceramic material according to said definition A, B, C, or D, bonded to or otherwise combined as aforesaid with a reinforcing material, the ceramic material being so arranged as to constitute rubbing surfaces.

Further according to the present invention

there is provided a ceramic part according to the said definition A, B, C, or D, adapted to be combined with a reinforcing support so as to form part of a ceramic lining of a garniture base, the said ceramic part being moulded with a central longitudinal groove or channel in one surface to form the groove of the garniture base, and with a pair of longitudinal grooves or channels formed in the reverse surface, one at each side of the part, whereby the thickness of the member is reduced in order to reduce the possibility of internal defects when the part is fired.

The grooves may be so dimensioned that both of the surfaces containing the said grooves have substantially equal surface areas, so as to reduce the possibility of unequal surface shrinkage on cooling.

Ceramic material according to said definition A, contains at least 90% of aluminium oxide.

Ceramic material according to said definition B contains from 75% to under 90% of aluminium oxide.

Ceramic material according to said definition C contains at least 90% of silicon carbide.

Ceramic material according to said definition D contains from 75% to under 90% of silicon carbide.

Usually, the folders of a garniture are easily removable, and are relatively cheap, and consequently, the folders need not have ceramic rubbing surfaces, and in any case, ceramic surfaces on the folders might not always be highly satisfactory in view of the fact that the ceramic material is extremely brittle. However, the present invention does not exclude a construction in which the rubbing surfaces of the folders are formed of ceramic material.

A garniture according to the present invention will now be described by way of example with reference to the accompanying drawings, in which:—

Fig. 1 is a plan view of a garniture base or block constructed according to the invention;

Fig. 2 is a sectional elevation of Fig. 1 taken along the centre line;

Fig. 3 is an end view of Fig. 1 looking in the direction of the arrow A;

Fig. 4 is an end view of Fig. 1 looking in the direction of the arrow B;

Fig. 5 is a cross section of a block of the kind shown in Fig. 1 with the addition of side folders usually employed in a garniture.

Referring to the drawings, the base of the garniture comprises an inset 1 made of ceramic material to provide a rubbing surface, combined with a reinforcing support 2 made of a suitable metal, such as steel, which has a high tensile strength. The support has relatively wide and deep channels 3 and 4 of rectangular cross-section formed in its

upper surface, which is for the purpose of accommodating the ceramic inset. The ceramic inset is, for convenience, made in four parts 5, 6, 7, and 8, each of which is moulded and then ground to the desired shape and size. In the upper surface of each of these parts is formed a central longitudinal groove 9 of such a nature that the four parts when arranged end to end have a continuous groove corresponding to the groove of an ordinary garniture base. The four parts of the inset are fitted into the channels 3 and 4 of the reinforcing support and are bonded to the latter in any suitable way, for example, by a suitable plastic bonding material. The bonding material known under the name "Redux", which comprises a phenol formaldehyde compound with polyvinyl, has been found suitable for this purpose. Thus, when the parts are assembled, the ceramic inset forms a lining of the metal support, while the latter reinforces the brittle ceramic inset.

Owing to the possibility of defects developing in the interior of the inset during manufacture, such as internal cracks or uneven crystallisation, it is desirable to keep the thickness of the inset as small as possible consistent with its being deep enough to take a groove of the necessary depth. This may be done as shown in Fig. 5 without reducing the overall depth of the inset by forming each part of the inset with two further longitudinal grooves 10 on the lower surface, that is, the reverse side to that in which the above-mentioned central groove is formed. These two further grooves are spaced apart one at each side of the part and are so shaped and disposed as to reduce the thickness of the part on each side of the central portion in which the central groove is formed, so that the thickness above these two grooves is the same (as nearly as practicable) as the thickness below the central groove. They are also designed to increase the surface area of the lower side so as to make this area equal to the surface area of the upper surface in which the central groove is formed. The purpose of this equalisation of surface areas is to reduce any tendency towards inequality in surface shrinkage when the material is fired, and so reduce the possibility of distorting the central groove, since it is of course important that this groove should be straight.

Side guides such as 11, Fig. 5, made of ceramic material, moulded and ground to desired shape and size, may also be bonded or otherwise secured to the reinforcing support of the garniture base. As these guides are normally detachable they preferably comprise steel blocks 12 to which the ceramic is bonded.

The side guides generally extend from the right hand end of Fig. 1 to the end of the tapering part of the garniture groove. The garniture folders are not shown and as pre-

viously stated, they need not have ceramic rubbing faces but if it is desired to construct them with such faces the method is obvious from the foregoing description

5 A suitable known ceramic material used in the example described, and known by the trade name "Sintox," comprises aluminium oxide powder mixed with a proportion of zirconium oxide and moulded into the desired
10 shape, and then fired and thereby re-crystallised.

The proportions are such that the material contains at least 90% of aluminium oxide. The finished moulded part is then ground by
15 suitable grinding wheels. This material is found to have a very high resistance to abrasion and to be suitable in other ways for use in making insets for garniture bases according to the invention. It is also a rela-
20 tively cheap material and is well suited for moulding and grinding to produce the necessary parts for the inset and the side guides. It will be understood, however, that ceramic comprising aluminium oxide with or without
25 bonding agents may be employed with good results.

For example, the material may consist entirely of aluminium oxide. In an alternative construction according to the invention
30 the proportions are such that the material contains from 75% to less than 90% of aluminium oxide.

In a further alternative construction the ceramic material employed comprises at least
35 90% of silicon carbide while in a still further alternative construction the material contains from 75% to under 90% of silicon carbide.

One advantage which is obtained by the
40 use of ceramic material according to definition A or definition B, for making garnitures which require high precision in manufacture, is that the moulded parts made of such material can be ground by silicon carbide
45 wheels, which latter in turn can be formed and dressed by diamonds or diamond wheels. Where, however, the ceramic material is according to definition C or D and therefore itself consists largely of silicon carbide, the
50 only practicable method at present known to the applicants of grinding the moulded parts is by means of diamond wheels, which cannot be dressed so easily or cheaply. Thus it will be seen that by the choice of ceramics
55 according to definition A or B the ceramic parts can be produced more cheaply and simply, since it is possible to use grinding wheels of a material which, while being harder than the aluminium oxide, can nevertheless be dressed by diamonds or diamond
60 wheels and thus one can avoid the relatively expensive process of forming and dressing a diamond wheel as is necessary where the ceramic parts are made of silicon carbide in
65 order to grind the ceramic parts to a high

degree of accuracy.

It will be seen that by means of the present invention it is possible to employ ceramic material, which is relatively easy to mould, for the rubbing surfaces of the lower part of
70 the garniture. Consequently, in spite of the fact that it would probably be unsatisfactory to make the whole of the garniture base from ceramic material, owing to its extremely brittle nature, it is nevertheless possible to
75 obtain a very advantageous construction by providing a ceramic inset bonded or otherwise united to a support formed of a high tensile material so as to be reinforced thereby thus rendering the composite unit practicable.
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Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be employed, we declare that what we claim is:—

1 A garniture base for a continuous rod
85 machine comprising a composite structure having a ceramic material according to definition A or definition B, as herein set out, to constitute a rubbing surface, and a support formed of material capable of reinforcing the
90 more brittle ceramic material and so combined with the latter as to reinforce it.

2. A garniture for a continuous rod machine having a garniture base formed with a ceramic lining, according to definition A,
95 or definition B, as herein set out, which is so bonded to, or otherwise combined with, a material capable of reinforcing the more brittle ceramic material, as to be reinforced by the said material, and having side guides
100 comprising ceramic material according to said definition A, B, C or D, bonded to or otherwise combined as aforesaid with a reinforcing material, the ceramic material being so
105 arranged as to constitute rubbing surfaces.

3. A ceramic part according to definition A or definition B, as herein set out, adapted to be combined with a reinforcing support so as to form part of a ceramic lining of a
110 garniture base for a continuous rod machine, the said ceramic part being moulded with a central longitudinal groove or channel in one surface to form the groove of the garniture base, and with a pair of longitudinal grooves
115 or channels formed in the reverse surface, one at each side of the part, whereby the thickness of the member is reduced in order to reduce the possibility of internal defects when the part is fired.

4. A method of manufacturing a garniture
120 base having a rubbing surface of ceramic material, comprising the steps of moulding ceramic material according to definition A or to definition B, as herein set out, to form a ceramic part, grinding the moulded part by
125 means of a grinding tool (e.g. a silicon carbide wheel) which can be dressed by a diamond or a diamond wheel, forming a support made of material (e.g. steel) capable of reinforcing the more brittle ceramic part, and
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combining the ceramic part with the support (e.g. by bonding) so that the support reinforces the ceramic part.

5 Garnitures and parts thereof for continuous rod machines, comprising a ceramic part according to definition A, as herein set out, constructed as herein described with reference to the accompanying drawings.

6. Garnitures and parts thereof, for continuous rod machines, comprising a ceramic part according to definition B, as herein set out, constructed as herein described with reference to the accompanying drawings.

7. A garniture base for a continuous rod machine, comprising a composite structure having a ceramic material according to definition C or definition D, as herein set out, to constitute a rubbing surface, and a support formed of material capable of reinforcing the more brittle ceramic material and so combined with the latter as to reinforce it.

8. A garniture having a garniture base formed with a ceramic lining, according to definition C or definition D, as herein set out, which is so bonded to, or otherwise combined with, a material capable of reinforcing the more brittle ceramic material, as to be reinforced by the said material, and having side guides comprising ceramic material according to definitions A, B, C or D, as herein set out, bonded to or otherwise combined as aforesaid with a reinforcing material, the

ceramic material being so arranged as to constitute rubbing surfaces.

9. A ceramic part according to the definition C or definition D, as herein set out, adapted to be combined with a reinforcing support so as to form part of a ceramic lining of a garniture base for a continuous rod machine, the said ceramic part being moulded with a central longitudinal groove or channel in one surface to form the groove of the garniture base, and with a pair of longitudinal grooves or channels formed in the reverse surface, one at each side of the part, whereby the thickness of the member is reduced in order to reduce the possibility of internal defects when the part is fired.

10. Garnitures and parts thereof for continuous rod machines, comprising a ceramic part according to definition C, as herein set out, constructed as herein described with reference to the accompanying drawings.

11. Garniture and parts thereof for continuous rod machines, comprising a ceramic part according to definition D, as herein set out, constructed as herein described with reference to the accompanying drawings.

Dated the 9th day of December, 1948.

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Printed for His Majesty's Stationery Office by Wicks & Andrews, Ltd., E.C.4. 39/244.—1949.
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies, price 2s. 0d. each (inland), 2s. 1d. (abroad) may be obtained.

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